



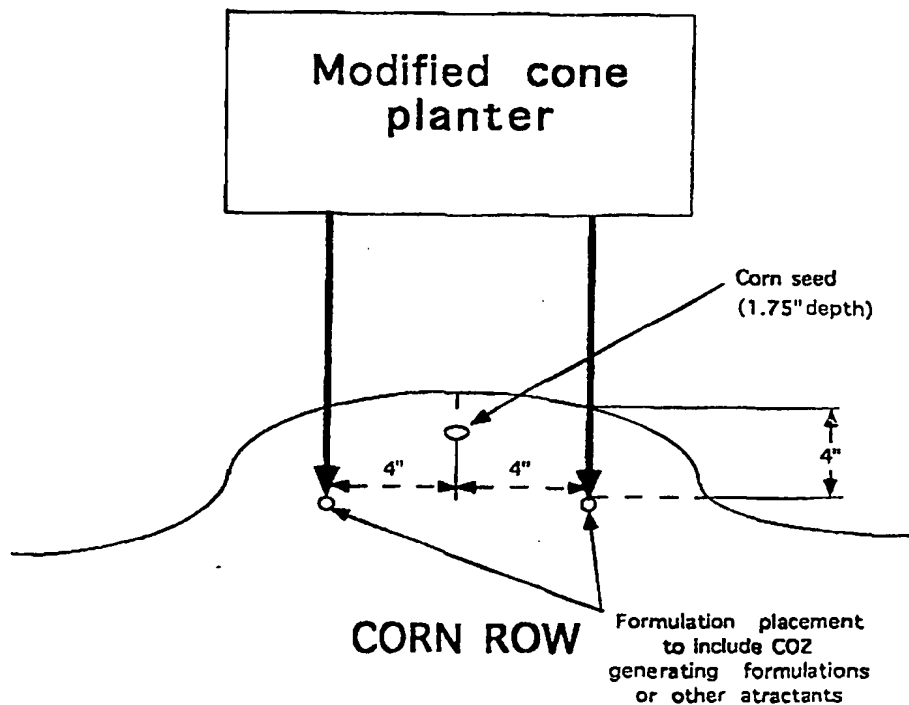
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : <b>A01M</b>	<b>A2</b>	(11) International Publication Number: <b>WO 00/27187</b> (43) International Publication Date: 18 May 2000 (18.05.00)
<p>(21) International Application Number: PCT/US99/26074</p> <p>(22) International Filing Date: 4 November 1999 (04.11.99)</p> <p>(30) Priority Data: 60/107,285 6 November 1998 (06.11.98) US</p> <p>(71) Applicant (for all designated States except US): COLORADO STATE UNIVERSITY RESEARCH FOUNDATION [US/US]; P.O. Box 483, Ft. Collins, CO 80522 (US).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): BERNKLAU, Elisa, J. [US/US]; 5605 Sunrise Court, Bellvue, CO 80512 (US). FROMM, Erich, A. [US/US]; 2541 57th Avenue, Greeley, CO 80634 (US). BJOSTAD, Louis, B. [US/US]; 6001 Blue Spruce Drive, Bellvue, CO 80512 (US).</p> <p>(74) Agents: KOVARIK, Joseph, E. et al.; Sheridan Ross P.C., Suite 1200, 1560 Broadway, Denver, CO 80202-5141 (US).</p>		<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>Without international search report and to be republished upon receipt of that report.</i></p>

(54) Title: METHOD AND DEVICE FOR ATTRACTING INSECTS

## (57) Abstract

A method and device for attracting insects involving the generation and/or release of particular amounts of carbon dioxide. Particular formulations as well as devices which incorporate such formulations for trapping, attracting and destruction of particular insects, including boring insects, such as termites and corn root worm insects, is set forth. Particular methods of administration of formulations and devices to enhance insect control and to prevent crop damage are disclosed.



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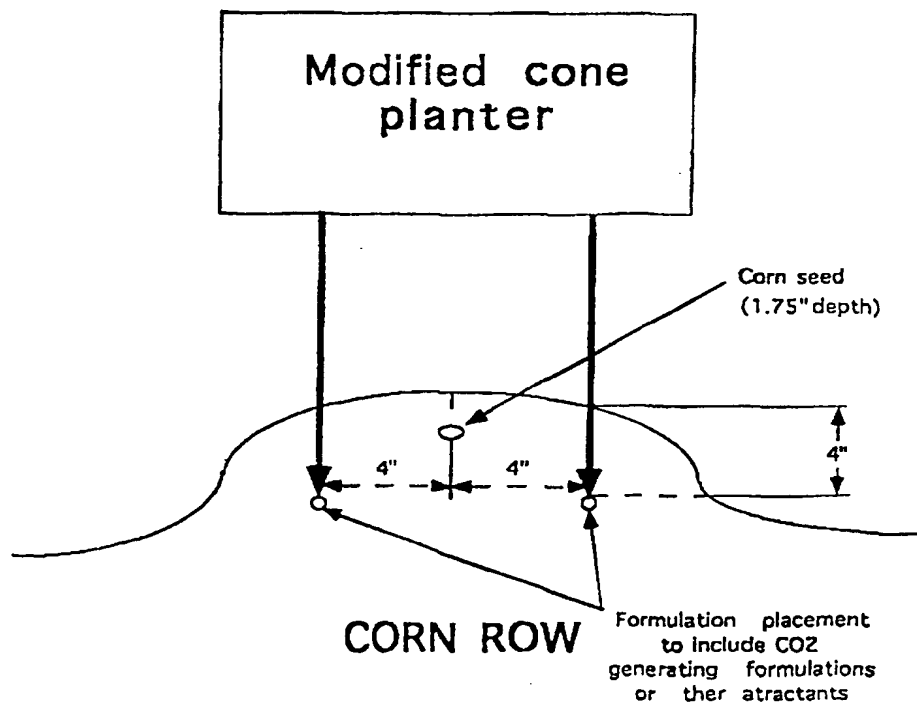


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>7</sup> :</b> A01M 1/02, 1/10, 1/20, A01G 29/00, A01C 23/02, E04C 1/00, B27K 5/00, A01N 25/00, B05D 3/00, B32B 3/26	<b>A3</b>	<b>(11) International Publication Number:</b> <b>WO 00/27187</b>  <b>(43) International Publication Date:</b> 18 May 2000 (18.05.00)
<b>(21) International Application Number:</b> PCT/US99/26074  <b>(22) International Filing Date:</b> 4 November 1999 (04.11.99)  <b>(30) Priority Data:</b> 60/107,285 6 November 1998 (06.11.98) US  <b>(71) Applicant (for all designated States except US):</b> COLORADO STATE UNIVERSITY RESEARCH FOUNDATION [US/US]; P.O. Box 483, Ft. Collins, CO 80522 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> BERNKLAU, Elisa, J. [US/US]; 5605 Sunrise Court, Bellvue, CO 80512 (US). FROMM, Erich, A. [US/US]; 2541 57th Avenue, Greeley, CO 80634 (US). BJOSTAD, Louis, B. [US/US]; 6001 Blue Spruce Drive, Bellvue, CO 80512 (US).  <b>(74) Agents:</b> KOVARIK, Joseph, E. et al.; Sheridan Ross P.C., Suite 1200, 1560 Broadway, Denver, CO 80202-5141 (US).		<b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>  <b>(88) Date of publication of the international search report:</b> 9 November 2000 (09.11.00)

**(54) Title:** METHOD AND DEVICE FOR ATTRACTING INSECTS**(57) Abstract**

A method and device for attracting insects involving the generation and/or release of particular amounts of carbon dioxide. Particular formulations as well as devices which incorporate such formulations for trapping, attracting and destruction of particular insects, including boring insects, such as termites and corn root worm insects, is set forth. Particular methods of administration of formulations and devices to enhance insect control and to prevent crop damage are disclosed.



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DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US99/26074

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : Please See Extra Sheet.

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 43/107, 121, 124, 132.1; 47/1.01F; 52/309.4, 517, Dig. 7; 111/118; 424/84, 405; 426/1; 427/372.2; 428/304.4, 319.1, 319.3

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

BRS EAST

search terms: carbon dioxide, CO<sub>2</sub>, water, blowing agent, building material, panel, foam, corn root worm, termite**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,189,830 A (MONTEMURRO) 02 March 1993, see entire document.	1, 2, 4
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Y		3, 5-7
X	US 2,763,991 A (KENNON) 25 September 1956, see entire document.	12-14
X	US 5,057,315 A (GUNNER et al) 15 October 1991, see entire document.	15
Y	US 1,599,408 A (CARDINET) 14 September 1926, see entire document.	16
Y	US 4,506,473 A (WATERS, JR.) 26 March 1985, see entire document.	16

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*G* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 17 JULY 2000	Date of mailing of the international search report 24 AUG 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer <i>Darren Ark</i> DARREN ARK Telephone No. (703) 305-3733

## INTERNATIONAL ARCH REPORT

International application No.  
PCT/US99/26074

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,459,334 A (BLANPIED et al) 10 July 1984, see entire document.	18
X	US 5,091,436 A (FRISCH et al) 25 February 1992, see entire document.	18
X	US 5,439,945 A (SMIES) 08 August 1995, see entire document.	19

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US99/26074

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☒ No protest accompanied the payment of additional search fees.

**A. CLASSIFICATION OF SUBJECT MATTER:**  
IPC (7):

A01M 1/02, 1/10, 1/20; A01G 29/00; A01C 23/02; E04C 1/00; B27K 5/00; A01N 25/00; B05D 3/00; B32B 3/26

**A. CLASSIFICATION OF SUBJECT MATTER:**  
US CL :

43/107, 121, 124, 132.1; 47/1.01F; 52/309.4, 517; 111/118; 424/84, 405; 426/1; 427/372.2; 428/304.4, 319.1, 319.3

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING**

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-7 & 11, drawn to a method to attract termites.

Group II, claim(s) 8-10, drawn to a method for controlling root worm infestation.

Group III, claim(s) 12-14, drawn to a method for attracting boring insects.

Group IV, claim(s) 15, drawn to a formulation for attracting corn root worms.

Group V, claim(s) 16 & 17, drawn to a termite trap.

Group VI, claim(s) 18, drawn to a building material.

Group VII, claim(s) 19, drawn to a method of reducing termite damage susceptibility of building materials.

The inventions listed as Groups I-VII do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group I is a method to attract termites comprising providing a CO<sub>2</sub> emitting source in an enclosure having openings not required in Groups II-VII;

Group II is a method for controlling root worm infestation comprising applying an organic compound selected from the group consisting of the group as claimed not required in Groups I & III-VII;

Group III is a method for attracting boring insects comprising placing a source of CO<sub>2</sub> emitting agent an effective distance from the roots of plants not required in Groups I, II, & IV-VII;

Group IV is a formulation for attracting corn root worms comprising an effective amount of a component selected from the group as claimed not required in Groups I-III & V-VII;

Group V is a termite trap device comprising a jar having a cover not required in Groups I-IV, VI, & VII;

Group VI is a building material comprising foam panels not required in Groups I-V & VII; and

Group VII is a method of reducing termite damage susceptibility of building materials comprising coating building materials not required in Groups I-VI.



What is claimed is:

1. A method to attract termites, comprising providing a CO<sub>2</sub> emitting source in an enclosure having openings sufficient to allow termites to pass therethrough, said CO<sub>2</sub> emitting source selected from the group comprising a biological, chemical or mechanical component, said CO<sub>2</sub> source releasing concentrations of CO<sub>2</sub> above that found in ambient soil;

positioning said enclosure with said CO<sub>2</sub> source contained therein at locations such that termites are attracted to said CO<sub>2</sub> source rather than to structures sought to be protected.

2. The method as set forth in Claim 1, wherein said CO<sub>2</sub> emitting source generates CO<sub>2</sub> in a concentration of from between about 2 to about 50 mm mol/mol.

3. The method as set forth in Claim 1, wherein said CO<sub>2</sub> emitting source comprises a biological source comprising charred cellulose material.

4. The method as set forth in Claim 1, wherein said CO<sub>2</sub> emitting source comprises CO<sub>2</sub> or CO<sub>2</sub> mimics combined with sources of insecticides, food, feeding stimulants and materials that stimulate insect movement.

5. The method as set forth in Claim 1, wherein said CO<sub>2</sub> emitting source comprising burned or charred natural or artificial materials.

6. The method as set forth in Claim 5, wherein said burned or charred materials are selected from the group consisting of wood, paper, cardboard, fabric, textiles, wool, silk, bone, hair, horn and claws.

7. The method as set forth in Claim 1, further comprising providing an agent toxic to termites within said enclosure.

8. A method for controlling root worm infestation, comprising:

applying an organic component selected from the group consisting of spent grain, distiller's grain, corn cob grits and microorganisms capable of producing effective amounts of CO<sub>2</sub> at about the time of planting and/or cultivation of a crop, said component applied by a method selected from the group consisting of plowing said compound into a field onto which a crop is to be grown and applying said compound between the rows of crop plants, whereby said compound emits effective levels of CO<sub>2</sub> to attract corn root larvae.

9. The method as set forth in Claim 8, wherein the step of applying comprising plowing said organic component into the soil of a field such that said components are administered in strips between or adjacent to rows of corn.

10. The method as set forth in Claim 8, wherein said step of applying is conducted during the planting and cultivation periods of a corn crop.

11. The method as set forth in Claim 7, wherein said organic component comprises spent grain, distillers grain or corn cob grits in a dry state wherein said components are applied to a field prior to such components being web, and thus, still possessing the ability to evolve significant amounts of CO<sub>2</sub>.

12. A method for attracting boring insects, comprising placing a source of CO<sub>2</sub> emitting agent an effective distance from the roots of plants such that larvae/insects are attracted to said agent without causing damage to said plant roots.

13. The method as set forth in Claim 12, wherein said boring insects are selected from the group

consisting of termites, corn root worms, carpenter ants and carpenter bees.

14. A method as set forth in Claim 12, wherein said CO<sub>2</sub> emitting source further provides fertilization to said plants.

15. A formulation for attracting corn root worms, comprising an effective amount of a component selected from the group of spent grain, distillers grain, corn cob grits, germinated corn, clean cracked corn, malted barley, malted grain, corn gluten feed, fungal organisms, bacteria, algae, microorganisms, inorganic carbonates, calcium carbonate, bicarbonate, alkyl carbonate, urea-based components, and mixtures thereof.

16. A termite trap device, comprising a jar having a cover operatively associated therewith, said cover having apertures therein such that the total area of apertures with respect to the jar's surface comprises no more than about 10% of the surface area of said cover, said jar containing an attractant material comprising a CO<sub>2</sub> emitting source.

17. The trap as set forth in Claim 16, wherein said jar also contains soil having a moisture content of at least about 10% by weight.

18. A building material resistant to termite damage, comprising foam panels manufactured using non-CO<sub>2</sub> containing gases.

19. A method of reducing termite damage susceptibility of building materials comprising coding CO<sub>2</sub>-based foam products used as building materials with an effective amount of sealing compound effective to preclude emission of CO<sub>2</sub> from said materials.